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Goddard Space Flight Center
Greenbelt, Maryland

From: Colorado School of Mines
Department of Geology

Subject: Type I report for the period 1 December 1973 to 31 January 1974
(NASA Contract NAS5-21778)

Title: Geologic and Mineral and Water Resources Investigations in Western Colorado (Proposal 026)

(GSFC Principal Investigator Identification No. UN 209)

INTRODUCTION

The primary objective of the Colorado School of Mines ERTS-1 Program is to analyze ERTS-1 data for identification and discrimination of geological and hydrological phenomena in central and western Colorado. To facilitate the achievement of this objective, the research has been subdivided into the following tasks:

Task I. Analyze ERTS-1 data for identification and discrimination of:

- A. lithology and surface composition
- B. geologic structure
- C. geomorphic phenomena
- D. mineral resources
- E. water resources
- F. volcanic phenomena

Task II. Determine the atmospheric affects on remote sensor data.

Task III. Investigate and evaluate:

- A. the RBV and MSS data for task I, A through F
- B. processing and enhancement techniques as applied to ERTS-1 data

Task IV. Educate graduate students and give experience to research personnel in the use of satellite remote sensor data.

Task V. Submission of a final report (Type III) which will discuss in depth the history of the overall project and all significant scientific and technical theories, procedures, techniques, equipment, tests and project results.

(E74-10255) GEOLOGIC AND MINERAL AND WATER RESOURCES INVESTIGATIONS IN WESTERN COLORADO Progress Report, 1 Dec. 1973 - 31 Jan. 1974 (Colorado School of Mines) 3 p HC $3.00

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CURRENT INVESTIGATION

During December and January, application of the technique used to pick potential mineral exploration targets in central Colorado was initiated in the area of the San Juan Mountains of southwestern Colorado. Potential targets of mineralization chosen through analysis of lineament data derived from ERTS imagery will be evaluated by comparing the target selections to known areas of mineralization and, possibly, new targets for exploration will be defined.

ERTS images acquired during various times of year were studied to determine the optimum sun elevation/snow cover relationship that provides the best imagery for mapping folds in northwestern Colorado. Analysis of the imagery is not yet completed, so results are forthcoming.

During this reporting period an experiment was initiated to quantitatively evaluate the capability to discriminate rock types on ERTS imagery. The experiment is designed such that each band of ERTS imagery for each of several times of year can be directly compared. The results of this study will be used along with a parallel study of Skylab/EREP photography to compare the relative merits of each type of space-acquired remote sensor data. A similar investigation on the mapability of linear features on ERTS imagery is planned if time and funding permit.

Research has continued into the use of color additive viewing techniques as an aid to interpreting ERTS imagery. Color composites are, in general, easier to interpret than single band, black and white transparencies, although a significant decrease in resolution occurs.

Statistical analysis of ERTS lineaments and ground data sets has continued during the last reporting period. At present, an extensive ground data set for the area of the Pikes Peak batholith is being processed by computer techniques for subsequent comparison with lineament data derived from ERTS images.

A study of the water resources of the Upper Arkansas River drainage basin was begun. This study will attempt to outline the utility of ERTS imagery in the general evaluation of water resources and provide information on the techniques for applying ERTS imagery to water resources studies.

PROJECT STATUS

Progress of ERTS-1 satellite and support data analysis, interpretation and evaluation is proceeding along a productive course. Funding will be sufficient through the scheduled completion of the project on 31 March 1974, however, several individual investigations currently being conducted will, of necessity, be incomplete. A 5-month funded extension at a rate of approximately $2,000 per month would be necessary see these investigations to the conclusions. The effected studies include the previously mentioned 1) quantitative evaluation of ERTS rock discrimination capability, 2) water resources investigation of the Upper Arkansas Valley, and 3) quantitative evaluation of ERTS lineament mapping capability.

NEXT REPORTING PERIOD

Current scheduling calls for the termination of active research in mid-February and the beginning of final report writing. The final report will be completed on 31 March 1974.

If a 5-month funded extension can be provided by NASA, research on the above mentioned studies will continue through July 1974 with the final report being submitted in August 1974.

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